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FRESNO STATE NORMAL SCHOOL

BULLETIN No. 3

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# RURAL SANITATION

FRESNO, CALIFORNIA

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# Rural Sanitation

BY

W. B. GIVENS,

Fresno State Normal School



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no. 3

## INTRODUCTION.

For the preparation of this bulletin, I am especially indebted to Dr. A. T. McCormack, secretary of the Kentucky State Board of Health. This southern state has developed the most satisfactory type of septic tank, as far as I know, for use without a water-pressure system that has yet been made in the United States. I have incorporated in this bulletin the larger part of a letter recently received from Dr. McCormack, giving so much information on the practical working of this system, that I thought it could not well be omitted.

I wish to thank Dr. G. L. Long, county health officer of Fresno County, whose cordial and enthusiastic co-operation has helped so materially to produce the plans for septic tank No. 2. I wish also to express my indebtedness to Mr. B. E. Cronkite, city engineer of Fresno, for the numerous suggestions he has given for the improvement of this particular type of septic tank.

W. B. GIVENS.

Fresno, Cal., June 15, 1915.





## RURAL SANITATION.

Country life in the United States has been and is receiving a great amount of attention. Farming now is considered a business and as such it is being considered from every point of view to make it more efficient. Some of the best scientific thought of the day is being applied to the problems of agriculture so that the financial returns may be better and more certain than heretofore. Better and more commodious farm houses are being built; attention is given to improved yards and better outbuildings. In many cases water is pumped by windmill or gas engine and piped into the house. There are also projects on foot for the improvement of social conditions in rural communities that people of all ages may have opportunities for social and recreational activities.

In the matter of rural schools, a great change has already taken place. Here in Central California, most of the new country school buildings now being erected are excellent and better suited for school purposes than were those of a few years ago. Much attention is given to improving school grounds, both in the matter of beautifying them and in the arrangement of playgrounds. Progress is indicated along all the lines mentioned and all is being accomplished that could be expected.

General rural improvement, in one respect, however, has not kept pace with the advance in most of the other lines enumerated. This is in the matter of sanitation. Cities in order to exist at all were compelled to put in sewers and to dispose of sewage and garbage in a satisfactory way. This has been particularly true of cities during the last century or even less. This sanitary improvement has been so well done, that within this period, the death rate in all cities has been greatly decreased. It is now known that many diseases are preventable and that with proper precautions, these can be greatly decreased or almost entirely eradicated. In a number of recent investigations, it has been discovered that typhoid fever is more prevalent in country districts than in large cities, and that it is still more common in small towns and villages than in either city or country, and that this condition is due solely to the lack of proper sanitary arrangements or to impure drinking water.

In a recent bulletin on "Rural School Houses and Grounds," by Fletcher B. Dresslar, issued by the United States Bureau of Education, this question of rural sanitation is discussed at considerable length. It might be mentioned in passing that this bulletin of Professor Dresslar's

is a most valuable one for teachers and school trustees. Professor Dresslar considers the various matters of school building construction, school yard arrangement, water supply, and sanitation in a most practical way. The whole bulletin is an epitome of results that have been worked out in various sections of the country and are here brought together for the first time. He says, "The two most important sanitary needs of country schools \* \* \* are sanitary toilets and a safe and abundant water supply." Out of 1,232 schools reporting in a survey made by Mr. Dresslar, 631 were adjudged insanitary. In the state of Pennsylvania, it was found that 50 per cent of 3,572 schools inspected were in an insanitary condition. More than a hundred photographs were taken of both exteriors and interiors of toilets of rural schools in Connecticut, New York, Vermont, Maryland, and New Jersey, and less than five per cent of the 109 examined are sanitary, or are even passably decent. While no complete investigation has been made in California, the conditions of many country schools are too well known to need comment. Finally, in his article on sanitation, Mr. Dresslar says, "Country schools must teach the truth of sanitation and they must also set the example of building sanitary toilets and of keeping them in good condition. They must complete their teaching through demonstration of theory by fact, through co-operative activity with the people."

The need of better rural sanitation is so well recognized over the whole country that sanitary experts are bestowing a great deal of attention on this most important subject. This is notably true of some of the states of the Middle West and of the South. Many state boards of health, colleges of agriculture, and normal schools are working on this problem, and some very efficient types of sewage disposal have been worked out. The State of Kentucky is doing some especially noteworthy work. The health authorities in that commonwealth, some time ago, clearly recognized the fact that but little headway could be made against typhoid fever and the hookworm disease unless better sanitation in rural communities could be secured. The diseases are transmitted only through means of insanitary sewage disposal, carried for the most part by flies, or by impure drinking water. So the Kentucky Board of Health attacked the problem so successfully that a most efficient type of septic tank has been worked out with which any country school, church, or farm house may be equipped at small cost. This particular type has been in operation in many places in Kentucky for several years and has given entire satisfaction.

The sanitary conditions of most of our country schools are, to say the least, unsatisfactory. In some cases these conditions are deplorable, obnoxious in every way, and a menace to the health of the neighborhood. Typhoid fever and other diseases are carried frequently from

such places to the food eaten by the children. This is a demonstrated fact. The germs of typhoid, hookworm, and other intestinal diseases are transmitted either in the food that people eat or the water they drink. For the worst type of open toilets, there never was any excuse. For the better type there was the excuse that people were doing the best that they knew and could afford to build. Now that sanitary experts have worked out means for overcoming one of the greatest shortcomings attendant on rural life, every country school can be made as wholesome and as healthful in this respect as can schools located in towns and cities having costly sewer systems.

## SEPTIC TANKS.

In Fresno County, and adjoining counties in Central California, there is a strong desire on the part of many people for better sanitary arrangements in country districts. For rural schools and farms that do not have water-pressure systems, nothing better has yet been devised than the Kentucky septic tank. Through the courtesy of the Kentucky State Board of Health, the general plans of this tank are here given, and this type is recommended for all places not having water-pressure with which to flush.

### SEPTIC TANK No. 1.

#### Kentucky Non-flushing Type.

Figures 1, 2 and 3 represent the self-cleaning, fly-proof septic tank privy which, after several years of experimental work, the Kentucky State Board of Health recommends for all country and town homes, schools and other places without sewer connections. Concerning the general success of this type of septic tank, Dr. A. T. McCormack, secretary of the Kentucky State Board of Health, writes as follows:

"The first Kentucky sanitary closet built, which has been in continuous operation since, is five years old. Its effectiveness was improved for six months since which time it has been constant. The only complaints that have arisen during the operation of these closets have been where the water has not been added regularly and then a very objectionable odor is produced.

The cost of construction varies quite a great deal. The cement usually costs about \$7.50. For private homes, we are now making the tank 6 x 4 x 4 in the clear and the cement for this costs \$5. The sand and gravel varies so much in cost that it is difficult to estimate it. In one section of the state, contractors are building tank and house for \$22 and the Louisville and Nashville Railroad Company has just let a contract for 3,000 tanks at \$60. A great many have been built at schools on the co-operative plan, the older boys doing the work and the girls furnishing a picnic lunch, while it is being built, at an actual expense from \$7.50 to \$12, and this money has been raised from exhibits and musicals and things of that sort, which has been very satisfactory.

Where water supply for flushing is available, it is important that the tank should be of such size as to retain the contents at least twenty-four hours. We usually make a calculation as to the average number of flushings and then double it and make our tank approximately that size. The tank should be placed tolerably close to the house and there should be a half-inch vent pipe from the first chamber for the escape of gas. The outlet pipe should be just barely below the surface so water from the incoming flushing will agitate the flood. It may be found necessary to extend the tile drains some, but you can tell whether this is necessary by there being a collection of water at the ends of the pipes.

I will be very glad indeed to give you any further information on the subject and in return will appreciate your experience both in the construction and use of the tank. We have about 3,600 in operation in Kentucky now.

Very truly yours,

A. T. McCORMACK,  
Secretary.

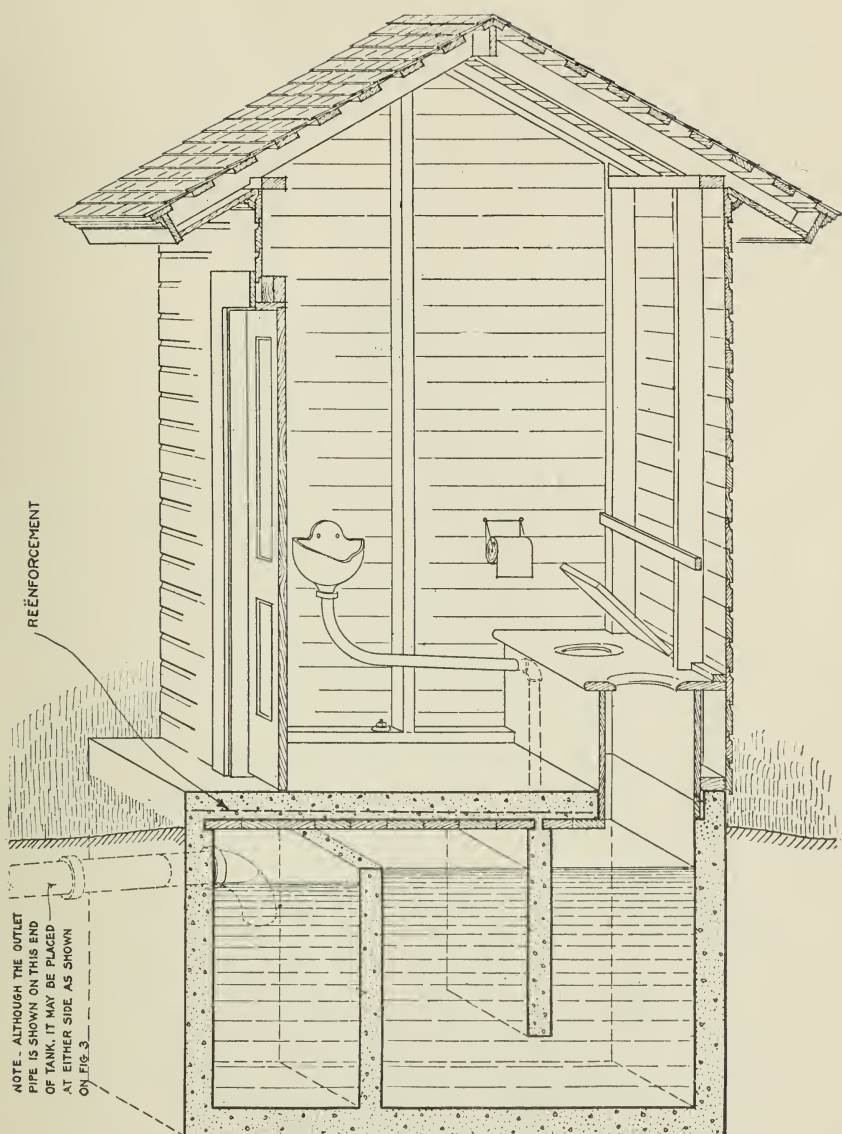


FIG. 1  
 VERTICAL SECTION OF TANK AND HOUSE  
**KENTUCKY SANITARY PRIVY**



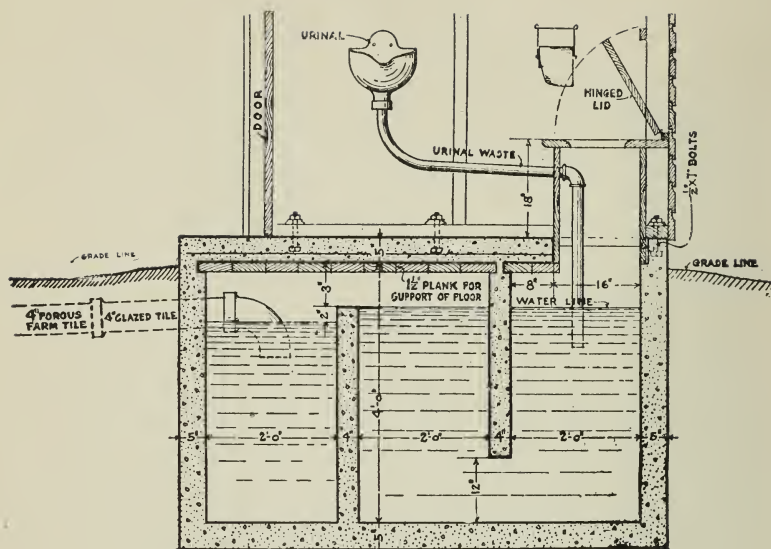


FIG. 2  
~ VERTICAL SECTION ~

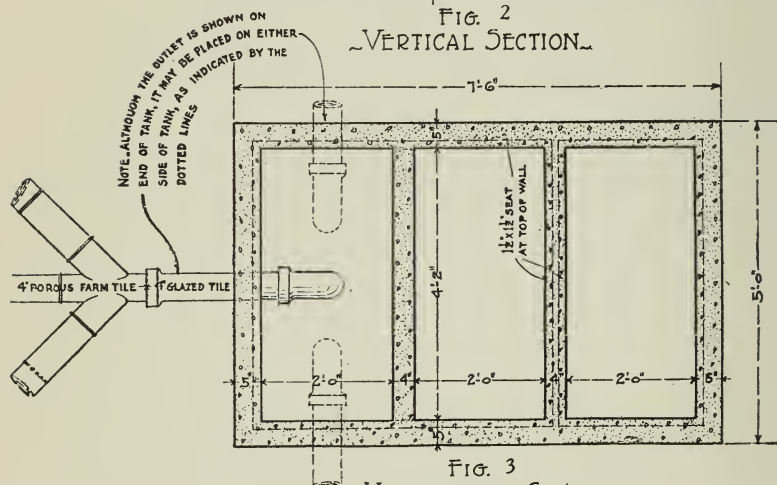


FIG. 3  
~ HORIZONTAL SECTION ~

### **Construction of Tank.**

The outside dimensions of the tank are 7' 6" long, 5' wide and 4' 10" deep. It should be water-tight when completed; if not, the ground around it will become foul with impurities and the tank will be no better than a cesspool. Concrete is recommended for permanence and can be made thoroughly water-tight. The proportions of materials for making the concrete are: Cement, one part; sand, two parts; and crushed rock or gravel, four parts. For a tank of this size, there will be required 15 sacks of cement, 1 yard of sand and 2 yards of gravel.

After the walls have set for three days, the forms may be removed and every portion of the interior should be plastered with a rich mixture composed of equal parts of cement and sand.

The top should be re-enforced with galvanized iron rods or wire to give greater strength. Bolts for fastening buildings to tank and also the pipes leading into and out of the tank should be put in place while the concrete is being poured.

### **The Tile Drain.**

As shown in the cuts, the first or curved joint of the drain should be of glazed tile, and the inner end should go well into the water to make it an effectual trap. As shown in figure 3, the drain may extend from the front or either side of the tank as will best suit the lay of the ground. The porous farm tile for the drains should extend 100 feet, more or less, depending upon the character of the soil, usually branching out as shown in figure 3. It should be laid below the frost or freezing line away from the spring or well, should discharge entirely under ground, never opening to the air at the end or any other point, and the surface over the drains should be utilized for a flower bed or rose garden, getting the benefit of the constant irrigation and fertilization, thus converting into a thing of beauty and pleasure what has heretofore always been a malodorous source of danger.

Where the tile can not be obtained, ditches eighteen inches wide and two and a half feet deep, extending the same distance as the tile drains and with the same fall, and filled half way up or more with rock about the size of the fist, over which flat stones are carefully laid and the joints well broken before the whole is covered with earth, will make a good substitute for tile drains, and probably answer the purpose nearly as well. In clay soils, rock placed around and over the tile drains in the same way will ensure better drainage. In using the stone-filled drains, it should be well remembered that the first or curved glazed joint of tile is essential and in all cases must be in place in the forms before the cement for the walls goes in.

### **Filling and Inoculating the Tank.**

Before the house is put in place and bolted down, the tank should be filled with water, five or six shovelful of old, well-rotted horse manure should be put in to inoculate the fluid with the liquefying, purifying germs upon which everything depends, a supply of toilet paper should be provided, and the privy is ready for use.

### **The Urinals.**

The urinals shown in the cuts are intended only for private homes or other places where they will be used by a small number of persons. For privies, schools, court houses or similar places to be used promiscuously by boys and men, most of them more or less careless, glazed iron troughs should be substituted for the urinals, and always should be placed in properly latticed sheds at the back or side of the privy, with the pipes extending through the wall and seat and well down into the water as shown in the cuts, and with the additional care as to daily flushing and cleanliness in proportion to the number of persons using them.

### **Location and Care of Premises.**

The septic tank should drain away from the well or spring. At least four gallons of water should be poured through each hole in the seat and through each urinal each day. This must be attended to with great care, or a very objectionable odor will result. Toilet paper only should be used, as heavier paper will help to fill the tank. The premises should be kept scrupulously clean.

**Cost.**

The cost of materials for the construction of the tank and drainage system, in Fresno, is about as follows:

15 sacks cement at 80 cents-----	\$12 00
1 yard sand -----	1 50
2 yards gravel -----	3 00
4 feet glazed tile -----	40
100 feet porous tile -----	10 00
Total -----	<hr/> \$26 90

**SEPTIC TANK No. 2.**

**Fresno State Normal School type. Designed for water-pressure systems.**

The plans herewith submitted are designed for country schools and farm houses that have water-pressure systems. A considerable number of such places in the rural districts of this section of California have installed windmills, gas engines or electric motors for pumping, and it is to meet this need that this plan is presented.

**Construction of Tank.**

The outside dimensions of the tank are 10' 6" long, 4' 10" wide and 5' 10" deep. It should be water-tight when completed; if not entirely so, the ground around it will become foul with impurities, and the tank will be no better than a cesspool. Concrete is recommended for permanence and can be made thoroughly water-tight. The proportions of materials for making the concrete are: Cement, one part; sand, two parts; and crushed rock or gravel, four parts. For a tank of this size, there will be required 33 sacks of cement,  $1\frac{1}{3}$  yards of sand, and  $2\frac{2}{3}$  yards of gravel. The size of tank here given will probably be large enough for most rural schools and farm houses. In the case of large schools, the dimensions of tank may be increased.

After the walls have set three days, the forms may be removed and every portion of the interior should be plastered with a rich mixture composed of equal parts of cement and sand.



# SEPTIC TANK NO. 2

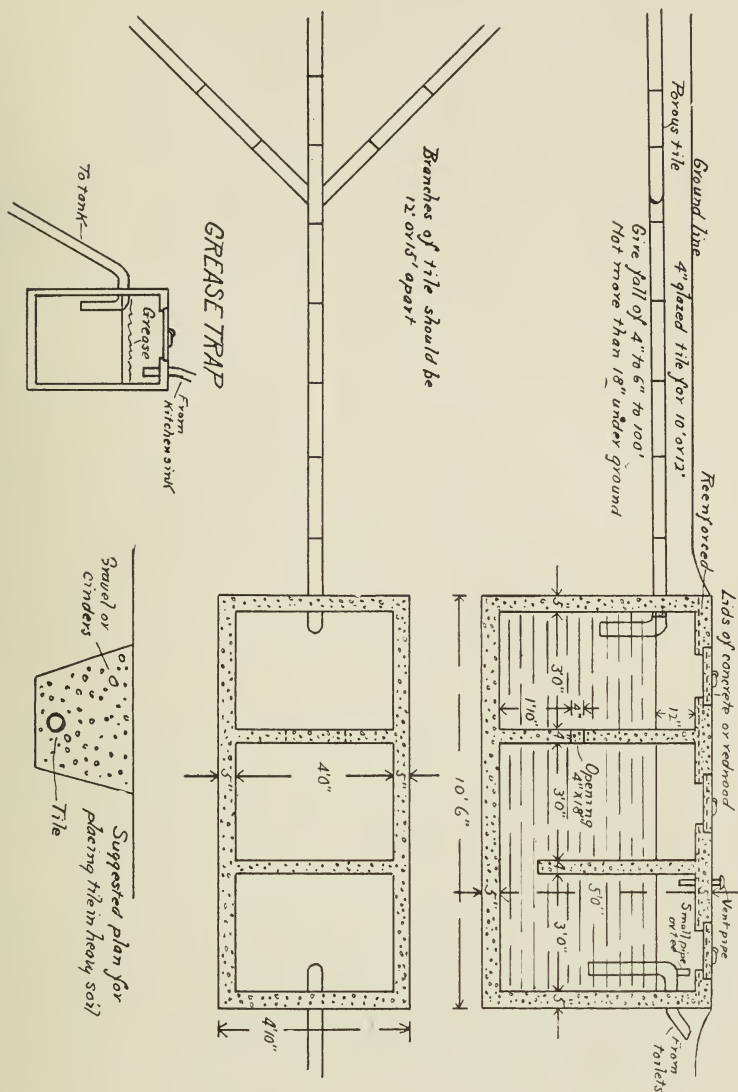


Fig 4

The top, and also the lids if made of concrete, should be re-enforced with galvanized iron rods or wire to give greater strength. The lids should be cemented when put in place to make the tank as nearly airtight as possible and to keep children and others out of it.

The pipes leading into and out of the tank should be put in place when the concrete is poured. A short piece of pipe or a tee is used at elbow on intake pipe from toilets for the purpose of making cleaning of pipe easy in case of obstruction. A small vent pipe for the escape of gas is placed in the top of first compartment.

#### The Tile Drains.

The tile drains for the first ten or twelve feet from the tank should be glazed and cemented together. This is done in order to make this section water-tight. The remainder of the tiles are porous, loosely jointed, and should be placed under ground not more than eighteen inches, and drainage will be better if they are placed only twelve inches below the surface. The fall of the entire drainage system should be from 4" to 6" to 100'. The amount of tile required will vary from 100' to 300' depending on the character of the soil. The lighter and more sandy the soil, the less pipe is required. In unusually heavy soil, it is advisable to first dig the trench to the required depth, place the tile and fill the trench with gravel or cinders. The drainage system may be laid straight or branch to suit the ground available or the contour of the land. Flowers or grass planted above distributing tile drains will increase the efficiency of the general system.

#### Inoculating the Tank.

When the tank is completed and filled with water, five or six shovelful of well-rotted horse manure should be put into it to inoculate the fluid with the liquefying, purifying germs upon which is everything depends. Toilet paper only should be used, as heavier paper is dissolved with much more difficulty and simply helps to fill the tank with refuse, making frequent cleaning necessary.

#### Urinals.

For schools and other places that may be used promiscuously by men and boys, most of whom are careless, urinals should be installed.

#### Kitchen Sinks and Bath Tubs.

The kitchen sink may drain into the tank provided the grease trap is used. A simple form is indicated in figure 4, using a barrel or concrete structure for the purpose. As the grease accumulates it can be skimmed off from time to time. Water coming from tubs should also be well trapped. In all cases, where kitchen sinks and tubs are discharged into the tank, pipes should be carried above the roof for proper ventilation.

#### Cost.

The materials required for the construction of the tank and drainage system here described, will cost, in Fresno, about as follows:

33 sacks cement at 80 cents-----	\$26 40
1½ yards sand -----	2 00
2¾ yards gravel -----	3 75
12 feet glazed tile -----	1 20
200 feet porous tile -----	20 00
Total -----	<hr/> \$53 35





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